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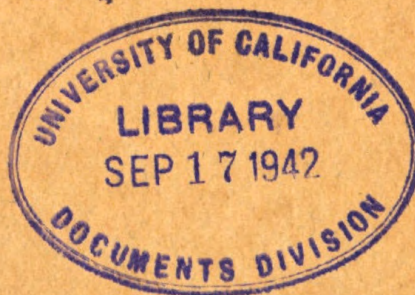
U.S. Dept. of Army

WAR DEPARTMENT

TECHNICAL MANUAL

TARGET RANGE COMMUNICATION  
SYSTEMS

January 16, 1942





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TECHNICAL MANUAL  
No. 11-431



WAR DEPARTMENT,  
WASHINGTON, January 16, 1942.

## TARGET RANGE COMMUNICATION SYSTEMS

Prepared under direction of the  
Chief Signal Officer

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1. **General.**—This manual is issued for guidance in the construction of communication systems on three types of small-arms target ranges. Although it may be necessary in practice to deviate somewhat from this manual to meet local conditions, the general scheme should be followed as closely as possible so that systems throughout the Army will be of the same general type. The arrangements of the communication system to be installed depend upon the type of range, its size and importance, and upon local conditions which vary for each locality. The telephones are used for communication purposes, and loud-ringing bells are installed in the butts for use as signals in rapid firing.

2. **Types of ranges and drawings therefor.**—*a.* There are three types of target ranges, as follows:

Type	Description	Drawing
1.....	Firing from successive positions over the same ground..	52011D1
2.....	Target butts in echelon.....	52011D2
3.....	Firing lines in echelon.....	52011D3

*b.* The drawings listed show all circuit connections and the location of the cable and apparatus with respect to the target butts and firing lines.

\*This manual supersedes TR 1190-15, March 30, 1929.

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c. The above drawings will be furnished by the Chief Signal Officer upon request.

d. Simplified single line diagrams of the three types of ranges are shown in figures 1, 2, and 3, respectively.

e. In figures 1 to 3, inclusive, each single line represents an individual cable pair or pair of twisted wire, unless otherwise indicated.

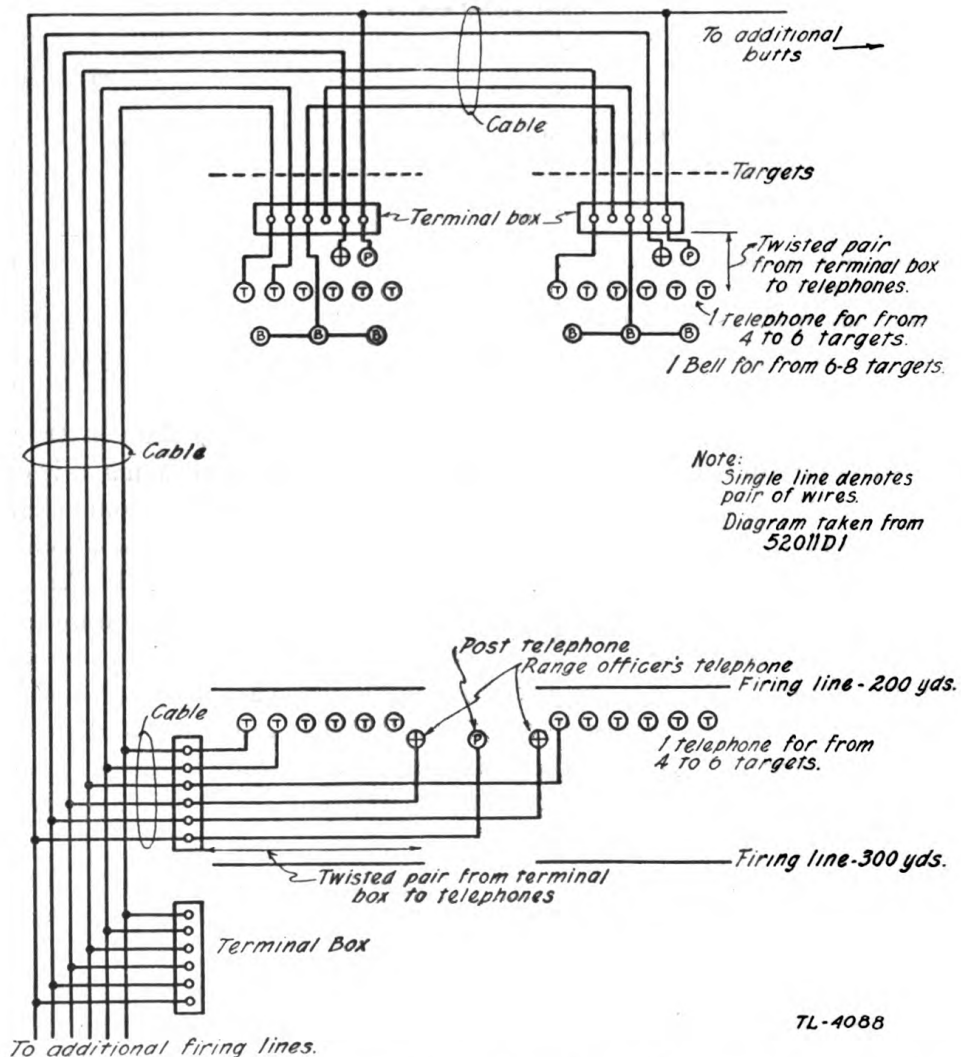


FIGURE 1.—Type No. 1 target range diagram, where firing is from successive positions over same ground.

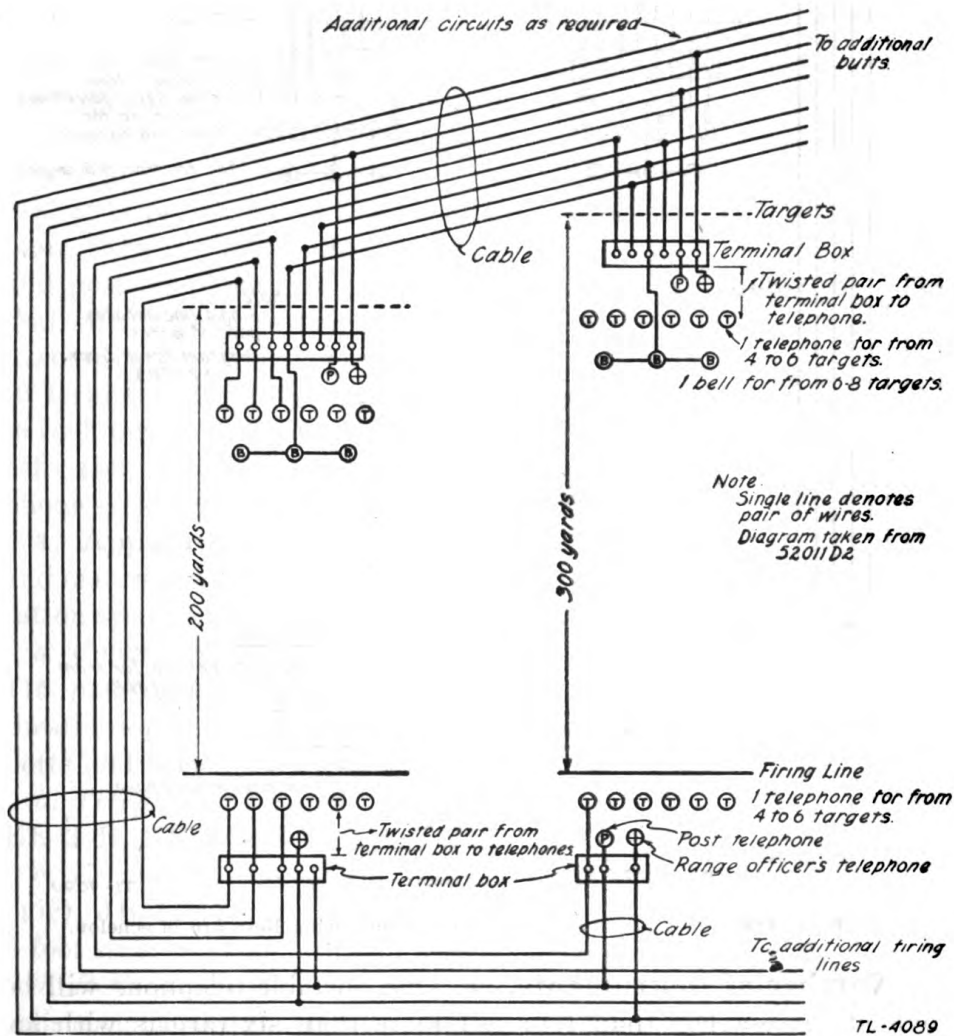


FIGURE 2.—Type No. 2 target range diagram, where target butts are in echelon.

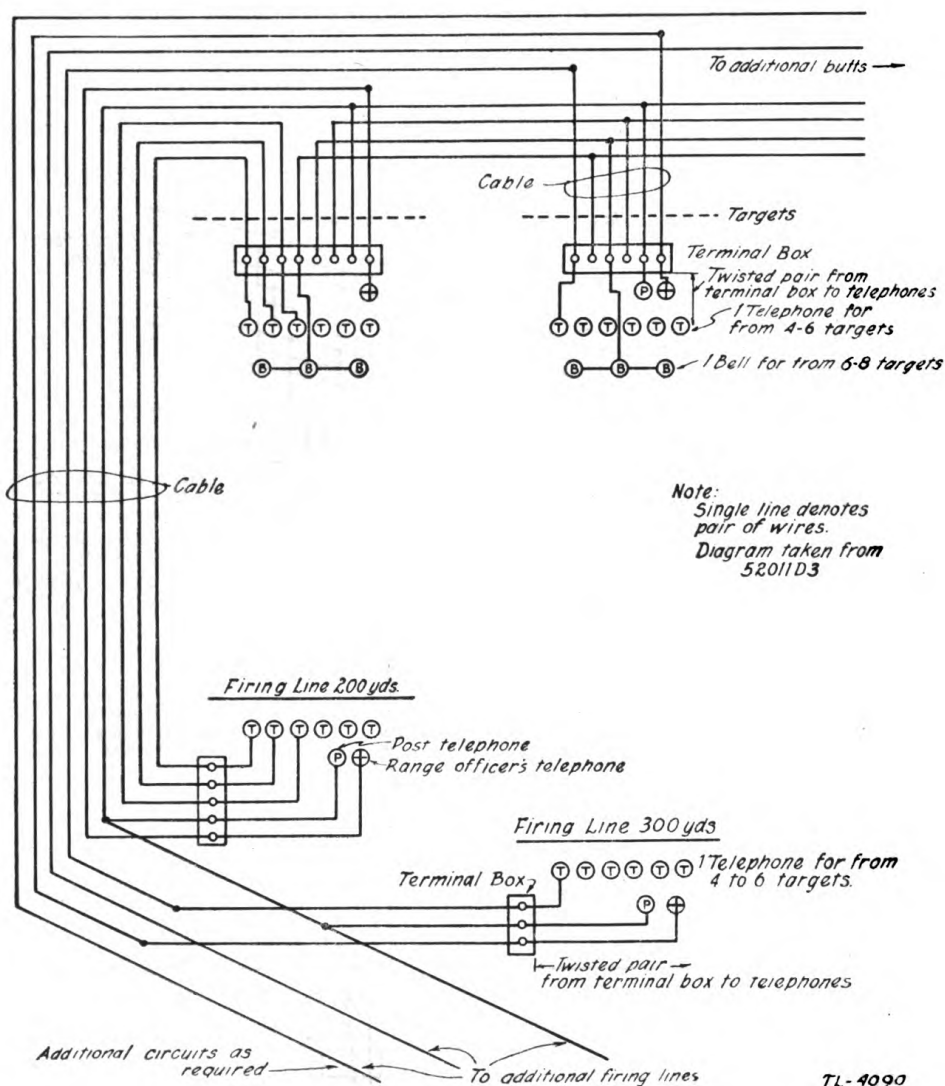


FIGURE 3.—Type No. 3 target range diagram, where firing lines are in echelon.

**3. Number of instruments.**—*a.* One portable telephone will be provided for not less than four nor more than six targets with an equal number at the firing lines. The minimum number of targets per telephone will, in most cases, be found to be more satisfactory than a large number.

*b.* In addition, there will be a range officer's telephone for administrative purposes at each section of the firing line and at each section of butt.

*c.* It is desirable that at least one telephone be provided at each firing line and each butt for communication with the post telephone

system. The various post telephone lines may be party lines with two or more telephones connected, or they may be individual lines. The arrangements provided depend upon the facilities available and the size and importance of the range. The circuit diagrams do not show a connection to the post telephone system, but this connection should be made at the most convenient point.

*d.* One loud-ringing extension bell will be provided for not less than six nor more than eight targets in those butts which are used for rapid firing practice. The loud-ringing bells shown on the diagrams of the three types of target ranges will be supplied only where required.

*e.* It is preferable to have one terminal box for each group of not more than six telephones, exclusive of the range officer's telephone and post telephone, both at the butts and at the firing lines, except that on the flank of firing lines of type 1 range it may be desirable to connect more than six telephones to each terminal box. In addition to terminals for target telephones there will be terminals available in each terminal box for the range officer's telephone, for loud-ringing bells (butt terminal boxes only), and for connection to the post telephone system.

**4. Apparatus and material.**—The following types of apparatus and material will be used in the construction of target range communication systems (see Signal Corps General Catalog) :

*a. Cable.*—Signal Corps cables, types WC-369 (10 pair), WC-370 (15 pair), and WC-371 (25 pair), 22-gage, paper-insulated, lead sheath, double steel tape armor, subterranean cable (used both in the butts and between the firing points and the butts).

*b. Telephones.*—Signal Corps telephones, types EE-3, EE-3-A, EE-3-B, EE-4, EE-4-A, EE-5, EE-8, or EE-8-A.

*c. Terminal boxes.*—Signal Corps terminal boxes, types JB-10 (10 pair), JB-11 (16 pair), and JB-13 (26 pair), each equipped with a 6-foot stub, entering either at the top or bottom, as called for.

*d. Bells.*—Signal Corps bells, type MC-9 (loud-ringing extension bells such as used on post telephone systems), each mounted in Signal Corps box, type BE-57.

*e. Hand generators.*—Signal Corps generator, type GN-36, consisting of a hand generator mounted in a suitable case.

*f. Wire.*—Signal Corps wire, type W-50. (Ordinarily used for extension lines from cable terminals to telephones and bells.)

*g. Posts.*—Posts for mounting terminal boxes should be about 6 feet long and be at least 6 inches in diameter. Old telephone poles cut to the desired length may be substituted. The posts may be cut from



durable wood obtained locally and should be set approximately 3 feet in the ground.

**5. Lines.**—*a.* All wires between target butts and firing lines, where six or more circuits are used, should preferably be in cable. If less than six circuits are required, open wire construction is considered suitable, provided the pole line is located well to the flank and that underground construction is used at all points where open wire construction would be exposed to fire.

*b.* In estimating the number of pairs required, provision should be made for one pair between each target telephone in the butt and the corresponding telephone at the firing line, at least one pair for the range officer's telephone to be multiplied across all butts and firing lines, and at least one other pair, connected to the post telephone system, multiplied to all butts and firing lines. In the larger ranges, also where the firing lines or butts are in echelon, and where firing on the various ranges may take place simultaneously, it may be desirable to have more than one range officer's telephone circuit and also more than one circuit to the post telephone system. (See par. 3*c.*) It will probably be desirable to make provision for interconnection between the various range officer's telephone circuits, when desired.

*c.* Armored cable should be buried not less than 30 inches below the surface of the ground. All splices should be carefully made using standard wiped joints and a board placed over each joint for protection. Lead-covered cables to terminals above ground should be protected with rigid metal conduit, if exposed to danger of mechanical injury.

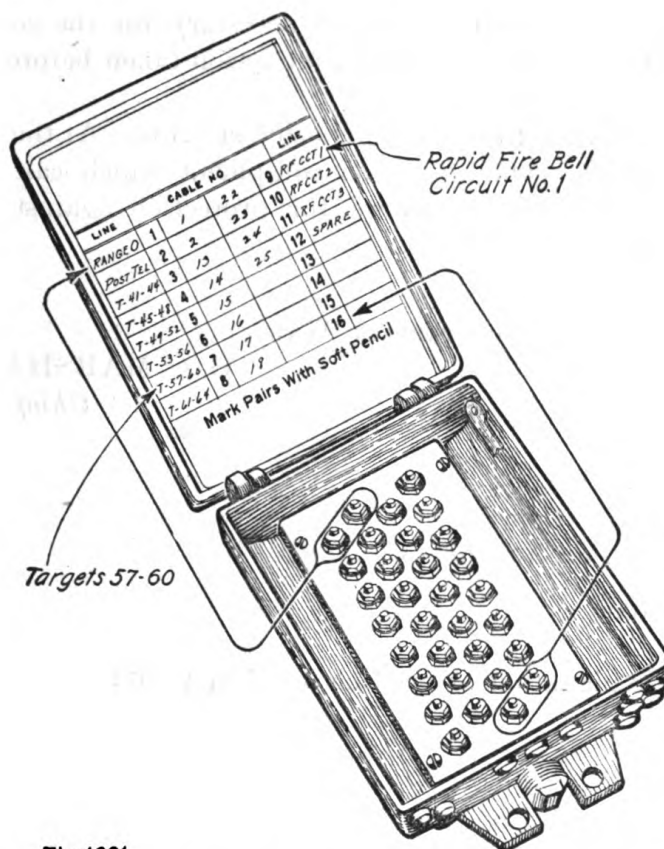
**6. Location of terminal boxes.**—*a.* Terminal boxes at target butts should be mounted on the walls in front of the targets and at convenient heights. From each terminal box there should be provided a line of bridle rings through which wire can be run to each telephone or loud-ringing bell.

*b.* At firing lines, terminal boxes should be mounted on wooden posts conveniently located in the rear of the firing position, except that when successive firing lines fire over the same ground, as in type 1 ranges, the posts should be located on the least exposed flank. Distributing wires from terminal boxes to the telephones are usually laid on the ground for temporary use only. Care must, therefore, be exercised to keep them, as far as practicable, out of the way of traffic.

**7. Terminal record.**—A terminal record identifying the circuits for which the various cable pairs are being used should be entered on the inside of the terminal box cover (see fig. 4). Ordinarily a white surface is provided in the cover of the box for this information.



In addition, a complete record of all terminal connections should be maintained by the post signal officer.



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FIGURE 4.—Terminal box JB-11, showing sample butt terminal record.

**8. Connections of loud-ringing bells.**—Loud-ringing bells at any one butt should be wired in multiple and this circuit should appear in all terminal boxes in all butts in the same range. It will then be possible to locate the hand generator set at any terminal box and connect it to any bell circuit desired. If fewer targets are required for rapid fire than those normally served by one loud-ringing bell circuit, the unnecessary bells may be temporarily disconnected at the bell or terminal box.

**9. Tests and repairs prior to practice season.**—*a.* To insure that the target range equipment is complete and in condition to give satisfactory service for the target season, the officer responsible for this service will cause a thorough test to be made of all equipment, wire, and cables at such times as will permit the making of needed repairs before the opening of the target-practice season.

b. If any material proves defective, a report stating the nature of the defects, accompanied by recommendations and a requisition for the necessary supplies, will be sent immediately to the corps area signal officer in order that the material necessary for the correction of defects may be provided and remedial action taken before the opening of the practice season.

**10. Dismantling at end of practice season.**—At the end of the practice season the communication equipment which can be advantageously removed will be stored for protection against theft and damage by exposure.

[A. G. 062.11 (11-6-41).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,  
*Chief of Staff.*

OFFICIAL:

E. S. ADAMS,  
*Major General,*  
*The Adjutant General.*

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(For explanation of symbols see FM 21-6.)



